

NEW SPECIES AND TAXONOMIC CHANGES IN THE  
GENUS *ENOCHRUS* (COLEOPTERA: HYDROPHILIDAE)

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## ABSTRACT

This article presents 6 new Nearctic species of the genus *Enochrus* (*E. pseudochraceus*, *E. interruptus*, *E. aridus*, *E. sharpi*, *E. sayi*, and *E. negrus*) and 7 subspecies (*E. carinatus carinatus*, *E. c. fucatus*, *E. piceus piceus*, *E. p. glabrus*, *E. pygmaeus pygmaeus*, *E. p. nebulosus*, and *E. p. pectoralis*). The controversial *E. pygmaeus* and *E. hamiltoni* groups are discussed. *Enochrus hamiltoni*, *E. horni*, *E. conjunctus*, and *E. collinus* are combined as a highly polymorphic species (*E. hamiltoni*) which can only be divided into color-forms and not subspecies. Lectotypes and paralectotypes are designated for many of the *Enochrus* described by LeConte, Horn, Fall, Melsheimer, and Zimmerman.

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This article is intended to present new species, subspecies, and synonymies so they will be available for a later publication on the whole genus.

The revision of the genus *Enochrus* of which this is a part was done at the University of Minnesota under Dr. Edwin Cook, Department of Entomology, Fisheries and Wildlife. Thanks to Dr. Cook's long enduring encouragement, this study has reached completion. Material for this revision was borrowed from some 40 institutions in the United States and Canada, but special thanks must go to Hugh Leech, Paul Spangler, Margaret Thayer, and David Miller for their comments and loans of large numbers of specimens. Numerous student assistants should also be acknowledged for their many hours of work in mapping, tallying, labeling, assembling plates, and innumerable other things over the years.

The genus *Enochrus* is represented by 24 species and 7 subspecies in the Nearctic Region. Although this genus is abundant and widespread, it has long been neglected. Revision of the genus revealed 6 new species, and study of material from the whole Nearctic has forced several taxonomic shifts within the genus.

Because of the large number of specimens examined distribution lists have not been included, although complete lists of specimens examined up to 1965 for the subgenera *Enochrus* and *Methydrus* are available in my thesis (Gundersen, 1967, pp. 211-253). Distributions are summarized at the end of each species description and represented in maps (fig. 73-85). A complete monographic treatment of the genus will be available as a separate publication from the author later in 1977.

*Enochrus (Enochrus) carinatus carinatus* (LeConte)

Figs. 1-3, 60, 76

*Philhydrus (Philhydrus) carinatus* LeConte 1855:370; (*nec* Horn 1873:126, 127) Miller 1964:69-70.*Enochrus (Enochrus) carinatus* (LeConte); Miller 1964:69-70 (*partim*).LECTOTYPE: female; gold dot and San Francisco, (San Francisco and San Jose in description); Type No. 3085, LeConte Collection, MCZ. PARALECTOTYPE: female; same data (missing head and prothorax); Type No. 3085<sup>2</sup>, LeConte Collection, MCZ.

LENGTH: 4.2-5.2 mm. WIDTH: 2.5-3.0 mm. COLOR: Dorsally yellow to yellowish-brown, head solid black (corners of head may appear lighter because of thinness), epipleura distinctly pale. ANATOMY: Last segment of maxillary palpi equal to or longer than penultimate; prosternal crest low but distinct, raised sharply anteriorly (fig. 2); mesosternal crest large, triangular, distinct tooth at tip, series of long setae on posterior edge (fig. 3); clypeal emargination fairly shallow, smoothly rounded; abdominal notch medium width and depth, W/D=3.4 (fig. 60); male prosternal claws basally enlarged, sharply bent; male genitalia typical, medium lobe 0.7 and dorsal strut 0.85 length of slender-tipped parameres (fig. 60).

DISCUSSION: The color pattern and proportions of the maxillary palpus separate this beetle from all other *Enochrus*. The original confusion was evidently due to a mistranslation by Horn of the original Latin description. He assigned the older name, *carinatus*, to what was the new black species (*E. piceus*), and the new name, *fucatus*, to the true yellow *E. carinatus*. Winters (1927) and others followed Horn's work without checking the types. Miller (1964) corrected the mistake.

DISTRIBUTION: Throughout California (fig. 76).

SPECIMENS EXAMINED: 313.

An interesting parallel variation occurs in *E. carinatus* and *E. piceus*. In the southern part of their ranges (Arizona, New Mexico, and Mexico) several long hairs typically present on the mesosternal crest are lacking. The southern forms also vary slightly in other anatomical features and color. To acknowledge this variation, I am separating these populations as subspecies of their respective species.*Enochrus (Enochrus) carinatus fucatus* (Horn), **new status**

Figs. 4, 5, 76

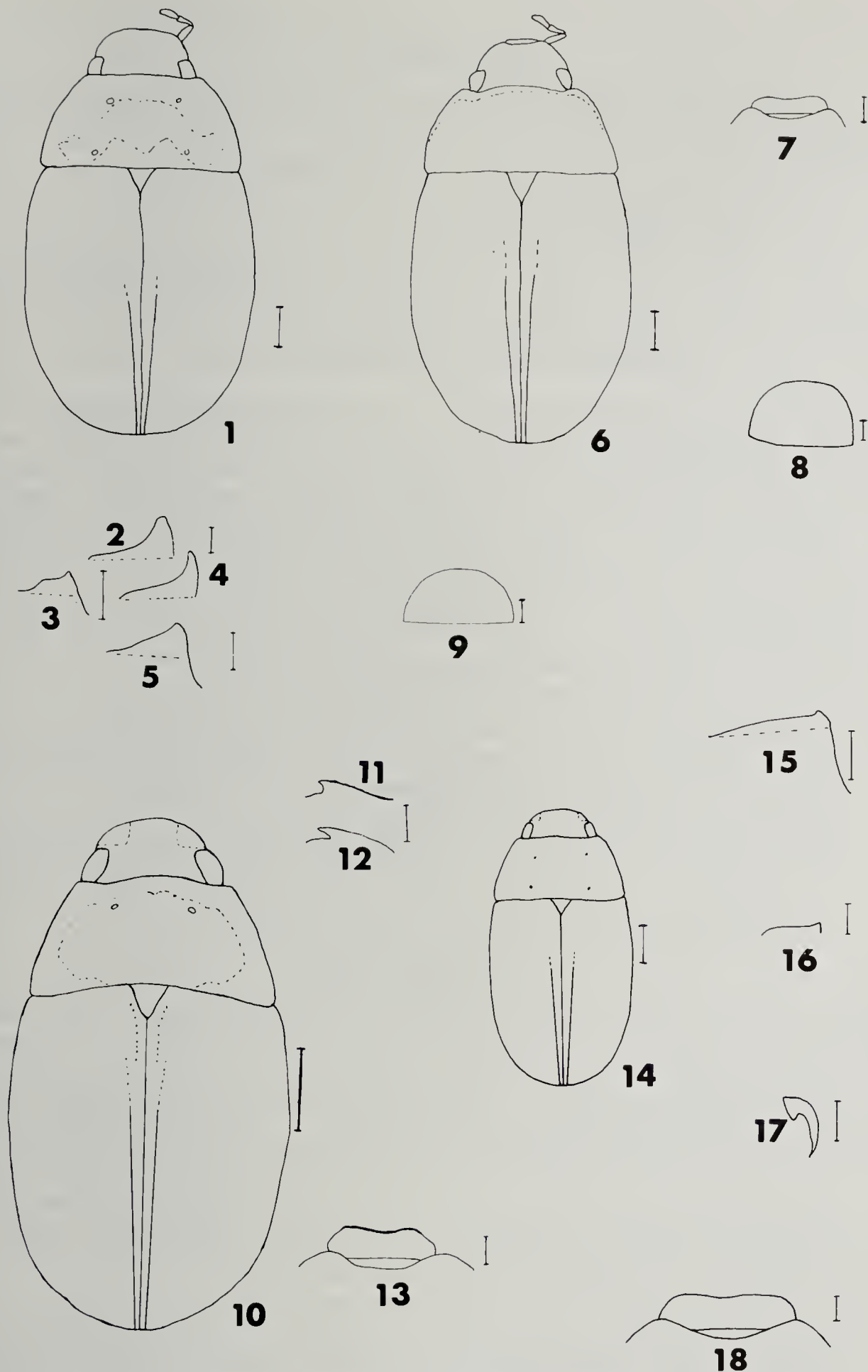
*Philhydrus (Philhydrus) fucatus* Horn 1873:127*Philhydrus (Enochrus) fucatus*; Horn 1890:244.*Philhydrus discedens* Sharp 1882:67 (cotype examined July, 1966 USNM),**new synonymy.**

LECTOTYPE: male; Utah; Type No. 2975, Horn Collection, MCZ (formerly ANS Phila.). PARALECTOTYPE: sex unknown; Utah; Type No. 3096, LeConte Collection, MCZ.

LENGTH: 4.3-5.5 mm. WIDTH: 2.5-3.2 mm. The description of the typical *E. carinatus* fits *E. carinatus fucatus* with the following exceptions: very few to no setae on mesosternal crest; prosternal and mesosternal crests higher (figs. 4, 5); color somewhat paler; and size averaging slightly larger.

DISTRIBUTION: Arizona, New Mexico, western Texas, and Central Mexico (fig. 76).

SPECIMENS EXAMINED: 63.



Figs. 1-18: 1-3, *Enochrus carinatus carinatus* (1, habitus; 2, prosternal crest; 3, mesosternal crest); 4-5, *E. c. fucatus* (4, prosternal crest; 5, mesosternal crest); 6-8, *E. piceus piceus* (6, habitus; 7, clypeal emargination; 8, section across abdomen); 9, *E. mexicanus*, section across abdomen); 10-13, *E. pseudochraceus* (10, habitus; 11-12, mesosternal crest; 13, clypeal emargination); 14-18, *E. sharpi* (14, habitus; 15, mesosternal crest; 16, prosternal crest; 17, male protarsal claw; 18, clypeal emargination); (scale line represents 0.5 mm, figs. 1, 6, 8-10, 14; 0.2 mm, figs. 2-5, 7, 13, 15, 16, 18; 0.1 mm, figs. 11, 12, 17).



*Enochrus (Enochrus) piceus piceus* Miller

Figs. 6-8, 59, 77

*Philhydrus carinatus*; Horn 1873:126-127 (*partim*); (*nec* LeConte) Miller 1964:70-71.

*Philydrus (Enochrus) carinatus*; Horn 1890:242-244 (*partim*); (not *Philydrus* as listed in Miller 1964:70).

*E. (E.) piceus* Miller 1964:70-71 (*partim*).

HOLOTYPE: male; Wilbur, Wash., VIII-24-1932; U. Wash. (not examined). ALLOTYPE: female; same data as holotype. U. Wash. (not examined). PARATYPES: 100; Washington, Idaho, Oregon, California (see Miller 1964 for exact list and deposition) (20 paratypes examined, 6 retained: Wilbur, Washington (2, UW); Pistol River, Oregon (2, UW, CMNH); Lake Lowell, Washington (1, UW); Roseburg, Oregon (1, UW)).

LENGTH: 4.3-6.0 mm. WIDTH: 2.2-2.8 mm. COLOR: Dorsally black, corners of clypeus slightly lighter (fig. 6). ANATOMY: Punctation of elytra coarser than that of pronotum and head; prosternal crest low, raised only anteriorly; mesosternal crest a broad triangle, possible tooth at tip, series of long hairs on posterior margin; clypeal emargination smoothly rounded (fig. 7); abdominal notch medium depth and width,  $W/D=2.7$  (fig. 59); male protarsal claws with small pointed basal lobe, moderately curved; male genitalia typical (fig. 59), median lobe 0.75 and dorsal strut 0.82 length of parameres; slightly longer and thinner than those of *E. carinatus*.

DISCUSSION: Within its range *E. piceus* resembles *E. mexicanus* and the dark phase of *E. hamiltoni*. Presence of an abdominal notch and prosternal crest separate it from *E. hamiltoni*. Its greater convexity (figs. 8, 9) and almost complete lack of yellow margins separate it from *E. mexicanus*. It bears a resemblance to the *E. cinctus-perplexus* group also, but these species are mainly eastern, have no prosternal crest, and have the last maxillary palp segment shorter than the penultimate.

*E. carinatus* and *E. piceus* are anatomically very close, distinguished almost exclusively on the basis of color pattern. Miller (1964) had difficulty in distinguishing between some *E. piceus* and *E. carinatus* in Oregon, and indicated a suspicion that they might be color forms of a single species. Perkins (1972), studying larvae of Hydrophilidae in Los Angeles County, California, found no dependable differences in the immatures. The parallel subspecies and widely overlapping distributions also lead to suspicion that they are merely color variations. I have, however, found virtually no color intermediates. *E. piceus* is always dark over the whole upper surface except for the corners of the clypeus. If the elytra are brown, then the head is also. *E. carinatus*, on the other hand, always has the head solid black, and even in light (teneral) specimens the head is much darker than the elytra. This does not preclude the possibility of synonymy. The final decision will have to be based on rearing and observation in the field.

This species has been recorded in 2 very interesting and contrasting habitats: hot springs at pH 8.3-9.3, salinity 1.0025-1.0074, and temperature 29-37.6°C (Brues 1932, *E. piceus piceus*); and under rocks in a stream which was partially covered with ice (La Rivers 1954, *E. piceus glabrus*).

DISTRIBUTION: Pacific Northwest from California to southern British Columbia west to Utah and Wyoming (fig. 77).

SPECIMENS EXAMINED: 1070.

*Enochrus (Enochrus) piceus glabrus* Gundersen, **new subspecies**

HOLOTYPE: male; Sunnyside Cn. W. side Huachuca Mts., 6,000 ft., Cochise Co., Arizona VIII-4-1952, H. B. Leech collector; Type No. 9376, CAS. ALLOTYPE: female;

same data as holotype, CAS. PARATYPES: 1, same data as holotype; 1, Chiricahua Mts., 5,000 ft., 3.5 mi. SW Portal, Arizona, Cochise Co., VIII-13-1952, H. B. Leech collector; 1, Miller Cn., Huachuca Mts., VII-23-1955, F. X. Williams, CAS.

LENGTH: 5.0-5.7 mm. WIDTH: 2.7-3.0 mm. The description of the typical *E. piceus* fits *E. p. glabrus* with the following exceptions: dorsal surface and legs slightly darker, corners of pronotum somewhat paler; mesosternal crest a little sharper with few to no long setae on posterior edge; punctation fine over whole dorsal surface.

DISCUSSION: See discussion under *carinatus carinatus* and *piceus piceus*.

DISTRIBUTION: Arizona to extreme western Texas (fig. 77).

SPECIMENS EXAMINED: 32.

### *Enochrus (Methydrus) cinctus* (Say)

The cotypes of this species were lost probably before reaching a museum, but the description was clear and reference was made to its presence in Pennsylvania. Say (1924) listed the type locality as "Red River of Lake Winnepeck" (Red River leading to Lake Winnepeg, Ontario on the Minnesota-North Dakota Border; Map in Barber (1928) and description of route in Say's letter to J. Melsheimer in 1823 (Fox 1902).

LeConte, in a note in his reprinting of the "Complete Works of Thomas Say (1859), stated that this was a "*Philhydrus*". LeConte (1855) and everyone since then has used this name unhesitatingly to refer to what is now known as *E. cinctus*. Therefore, I see no reason not to designate a neotype from material bearing that name. Because the original locality is on the fringe of the species range and no specimens were available from the type locality, a specimen from near the center of the range has been selected.

COTYPES: Red River of Lake Winnepeck, August, 1823, LOST.

NEOTYPE: male; Ringwood, Ithaca, N.Y., VII-14-1917, Dietrich collector; (Determination label: "*E. cinctus*, det. Dietrich"); Type No. 4422, Cornell.

### *Enochrus (Methydrus) interruptus* Gundersen, **new species**

Figs. 52-57, 69, 79

HOLOTYPE: male; Okeechobee, Florida, III-18-1943, Wm. Procter collector; Chamberlain Collection; (bore labels "*E. cinctus* Say, det. Deitrich and *E. perplexus* Lec."); Type No. 4423, Cornell. ALLOTYPE: female; same data as holotype, Cornell. PARATYPES: Cornell: 1, same data as holotype; 1, same data but III-19-1943; 3, Lake Placid, Florida, IV-2-1945, J. G. Needham (1 in author's collection); 2, Lake Placid, III-IV-1945 (1 in author's collection); 5, Lake Placid, IV-19-1950; CNM; 5, 3 mi. SW. Lake Marion, Florida, III-15-1956 (1 in author's collection); 6, same data but III-14-1956, lights (1 in author's collection).

LENGTH: 4.8-6.0 mm. WIDTH: 2.6-3.5 mm. COLOR: Dorsally black corners of clypeus, edges of pronotum and elytra narrowly to broadly brown to yellow (fig. 52), palpi completely yellow. ANATOMY: Prosternum not carinate; mesosternal crest a large, thin triangle (fig. 54); clypeal emargination smoothly rounded (fig. 53); abdominal notch wide but shallow, W/D=4.3 (fig. 69); protarsal claws of male only slightly enlarged basally (figs. 55, 56); male genitalia with tips of parameres bent outward at tip (fig. 69), a small notch 0.4 from base of paramere on inner edge, median lobe 0.4 and dorsal strut 0.85 length of parameres; dorsal strut in lateral view abruptly thickened and curved upward near tip.

DISCUSSION: Specimens of this species were formally placed under one of these names: *E. consors*, *E. consortus*, *E. perplexus*, or possibly *E. cinctus*. *E. interruptus* is most similar to a rather robust *E. perplexus*, about intermediate in convexity between this species and *E. consors* and *E. consortus*. *E. interruptus* is distinguished from *E. consors* and *E. consortus* by its thinner mesosternal crest, thinner parameres, longer median lobe, and less



convex body. *E. interruptus* is distinguished from *E. perplexus* by the deeper abdominal notch, more sharply bent dorsal strut, notched paramere, and more convex body (fig. 57, 58).

DISTRIBUTION: Louisiana, Florida, and Georgia, also New Jersey (fig. 79).

SPECIMENS EXAMINED: 116.

*Enochrus (Methydus) pseudochraceus* Gundersen, **new species**

Figs. 10-13, 62, 80

*Philhydus ochraceus*; Sharp 1882:70 (*partim*)

HOLOTYPE: male; 12 miles southwest of Liberia, Costa Rica, VII-13-1965; collected by P. J. Spangler, Type No. 69621, USNM. ALLOTYPE: female, same data as holotype, USNM. PARATYPES: 320 males and 255 females; same data as holotype, USNM and author's collection (5 males, 5 females).

LENGTH: 2.7-3.7 mm. WIDTH: 1.5-2.0 mm. COLOR: Dorsally yellowish-brown to brown; center of pronotum slightly to distinctly darker; vertex and central 0.6 of clypeus black (fig. 10). ANATOMY: Prosternum not carinate; mesosternal crest low and rounded (figs. 11, 12), a distinct backward pointing tooth just posterior of the middle; clypeal emargination slightly flattened centrally (fig. 13); abdominal notch deep (fig. 62), W/D=1.3; male genitalia with tips flattened and out-turned (fig. 62); median lobe very long, broad, pointed, 0.95 length of parameres; dorsal strut not visible ventrally, equal in length to median lobe.

DISCUSSION: This species is Neotropical, but occurs along most of the southern border of the Nearctic. *E. pseudochraceus* is very similar to *E. ochraceus* in general appearance and structure. However, the backward pointing tooth on the mesosternal crest of *E. pseudochraceus* and the respective differences in genitalia easily separate them (figs. 61, 62). The lack of a prosternal crest separates it from the very similar *E. pygmaeus* complex found in parts of the same area. The series labeled *Philhydus ochraceus* by Sharp in 1882 contained both *E. ochraceus* and *E. pseudochraceus*.

Balfour-Browne first recognized this species and in his collection tentatively gave it the name "*E. d'orchymonti*". This name had already been used by Mouchamp (1956). Dr. P. J. Spangler compared specimens of *E. pseudochraceus* to the specimens in Balfour-Browne's collection in 1966 and found them to be conspecific. This left the species with no valid or published name.

DISTRIBUTION: East and west coasts of Mexico, Central America, throughout the West Indies, and possibly down the west coast of South America (fig. 80).

SPECIMENS EXAMINED: 2,000.

*Enochrus pygmaeus* complex

This very abundant, widespread group consists of 7 species and 3 subspecies in the Nearctic. Of these, 5 species and 3 subspecies are found in the United States. They are medium to small, 2.7-4.8 mm., and have both prosternal and mesosternal crests. Attempts to classify this group have produced serious taxonomic disagreements. Some have combined while others have split the group into many species. Horn (1890) and Zaitzev (1908) have included the whole complex, except *E. cristatus*, under the name *E. nebulosus*, while listing *E. pygmaeus* as a questionable species. Leech (1948) considered them as a complex and gave a very complete discussion of the geo-

graphic forms and suggested likely synonymies. His breakdown of species and subspecies agrees quite closely with mine. For a more complete list of synonymies than possible here, see Gundersen (1967).

*Enochrus (Methydrus) pygmaeus* (Fabricius)

*Hydrophilus pygmaeus* Fabricius 1792:186, no. 23; 1801:254, no. 28.

*Enochrus pygmaeus* can be separated into 3 subspecies. Specimens from the centers of their respective ranges can easily be separated: (1) typical ssp.—West Indies and Mexico-United States border, (2) ssp. *E. p. nebulosus*—east-central states, and (3) ssp. *E. p. pectoralis*—western states. However, where the 3 subspecies meet in southern Texas and Mexico, they are virtually indistinguishable. To determine which subspecies is referred to in local keys and faunal lists, check the distribution maps (Fig. 81, 82, 84).

*Enochrus (Methydrus) pygmaeus pygmaeus* (Fabricius)

Figs. 29-33, 63, 81

*Hydrophilus pygmaeus* Fabricius 1792:186, no. 23 (Americae meridionalis aquis, Dr. Pflug); 1801:254, no. 28 (Americae meridionalis insulis, Dr. Pflug).

*Enochrus pygmaeus pygmaeus* (Fabricius); Young 1953:14.

*E. (Methydrus) pygmaeus* complex, No. 1; Leech 1948:452 (*partim*).

*E. (M.) rossi* Leech 1948:451 (Type No. 5467, CAS, paratype examined).

HOLOTYPE: (only specimen in Fabricius collection) "Americae meridionalis Insulis, Dr. Pflug." (Antilles). Kiel Museum (on loan to Copenhagen Museum in 1966); (see d'Orchymont 1933, p. 307, for type locality discussion.) (Specimens sent to Copenhagen Museum for comparison.)

LENGTH: 3.4-4.8 mm. WIDTH: 1.85-2.7 mm. COLOR: Dorsally yellowish-brown to brown except head and center of clypeus (fig. 29); ventrally black, prosternum and mesosternal crest may be lighter. ANATOMY: Punctuation fine to medium over whole dorsal surface; prosternal crest high and sharp (fig. 33) mesosternal crest large (fig. 32), tip drawn out to a distinct tooth, posterior edge straight to slightly convex, clypeal emargination smoothly rounded to slightly flattened; abdominal notch medium width, fairly deep (fig. 63),  $W/D=2.1$ ; male protarsal claws slightly toothed but sharply bent (figs. 30, 31), male genitalia (fig. 63) with median lobe 0.65, dorsal strut 0.8 length of slender-tipped parameres.

DISCUSSION: *Enochrus pygmaeus pygmaeus* is most similar to *E. sayi* and the other *pygmaeus* subspecies. It differs from *E. p. pectoralis* in having heavier punctuation, larger size, and longer mesosternal crest (figs. 32, 34, 35). Although similar in punctuation to *E. p. nebulosus*, *E. p. pygmaeus* is larger and has a larger mesosternal crest. *E. sayi* has the same basic color pattern, but the posterior margin of its mesosternal crest is broadly convex (fig. 27) and its prosternal crest is low (fig. 26).

DISTRIBUTION: Florida, southern portions of the southern states from Florida to California, Lower California, east and west coasts of Mexico, the northern West Indies to the northern Antilles (fig. 81).

SPECIMENS EXAMINED: 287.

*Enochrus (Methydrus) pygmaeus nebulosus* (Say)

Figs. 38, 39, 64, 84

*Hydrophilus labiatus* Knoch; Melsheimer 1806:47, no. 1049 (*nomen nudum*)

*H. nebulosus* Melsheimer 1806:47, no. 1049 (*nomen nudum*)

*H. nebulosus* Say 1924:277.



*Enochrus pygmaeus* complex, no. 1; Leech 1948:452 (*partim*).

HOLOTYPE: "Lake of the Woods" (Ontario-Manitoba-Minnesota border) September, 1823, LOST (Locality discussion, Fox 1902:39; map, Barber 1928:16).

NEOTYPE: male; Harrison Lake, Fulton Co., Ohio, IX-27-1952, I. Slesnick, P. J. Spangler Collection, 1962; Type No. 69623, USNM.

LENGTH: 3.4-4.2 mm. WIDTH: 1.6-2.3 mm. COLOR: Dorsally yellow, center of pronotum may be somewhat darkened, head and center of clypeus black. ANATOMY: Punctuation fine; prosternal crest low to medium height (fig. 38); mesosternal crest medium (fig. 39), posterior margin slightly convex, no distinct tooth at tip; clypeal emargination deep and wide, centrally flattened; abdominal notch medium sized (fig. 64), W/D=2.2; male prosternal claws with distinct basal tooth, sharply bent; male genitalia (fig. 64) with medium lobe 0.6, dorsal strut 0.75 length of parameres.

DISCUSSION: Since the original type of *E. p. nebulosus* cannot be located, I have designated a Neotype from the center of the distribution of the subspecies. Some of Say's types are in LeConte's collection (MCZ) (Darlington 1961), but none of his *nebulosus* are from the type locality. The type locality, "Lake of the Woods", is a questionable locality for what has long been called *nebulosus* (fig. 84). However, this name has been used to refer to this form for 150 years. Of 9 specimens labeled "*P. nebulosus*" in LeConte's Collection (1850's and 1860's), 7 are what I am calling *E. p. nebulosus* and 2 are *E. sayi*, a more southern species. Also, the one specimen labeled "*E. nebulosus*" in Winter's 1920's collection is *E. p. nebulosus*.

*E. p. nebulosus* is distinguished from the sympatric *E. sayi* by its smaller, more triangular mesosternal crest (figs. 27, 39) and dark prosternum. Distinct punctuation separates it from the similar but smaller *E. p. pectoralis*. The medium size mesosternal crest best separates it from *E. p. pygmaeus*. It also bears a strong resemblance to *E. ochraceus* which, however, has no prosternal crest and only a small rounded mesosternal crest.

Wilson (1923-24) lists this species as feeding on algae but laying its eggs on broad-leaf water plants such as *Potamogeton*. This agrees with Young (1954) who lists it as not found in temporary situations.

DISTRIBUTION: New England states to Colorado and Wyoming down to Texas and back through the Gulf states excluding Florida and Georgia. It is most abundant east of the Mississippi and above the Ohio River (fig. 84).

SPECIMENS EXAMINED: 1,826.

*Enochrus (Methydrus) pygmaeus pectoralis* (LeConte)

Figs. 34-37, 65, 82

*Philhydrus (Philhydrus) pectoralis* LeConte 1855:370

*E. (Lumetus) nebulosus* var. *pectoralis* (LeConte); Winters 1927:21.

*E. (Methydrus)* near *pectoralis*; Leech 1948:452 (Leech material examined).

*E. (M.) pygmaeus* complex, No. 2; Leech 1948:452 (Leech material examined) (*non*) *Philhydrus maculifrons* Motschulsky 1859:179: as seen in LeConte 1863b:19; Horn 1873:127; Leng 1920:84; *fide* Leech 1948:452. (= *E. (M.) cristatus* (LeConte) based on description).

LECTOTYPE: male; gold dot (California), (Colorado River, California, description); Type No. 3089, *P. pectoralis* LeC. Col., LeConte Collection, MCZ. PARALECTOTYPE: gold dot (California) (missing head and prothorax); LeConte Collection, MCZ, see discussion below.

LENGTH: 2.7-3.6 mm. WIDTH: 1.6-2.0 mm. COLOR: Dorsally yellow to yellowish-brown, head and center of clypeus black; sides of mesosternal crest, prosternum, and epipleura often paler. ANATOMY: Elytral punctuation not evident to very fine at 30X, only the typical stria rows of punctures evident; prosternal crest high and sharp (fig. 36); mesosternal crest medium, very acute (figs. 34, 35), anterior edge nearly



vertical; clypeal emargination medium depth and smoothly rounded to flattened centrally (fig. 37); abdominal notch wide and deep (fig. 65),  $W/D=2.6$ ; male protarsal claws with large bluntly pointed basal lobe which forms a narrow notch with free end of claw; male genitalia with median lobe gradually widened toward base (fig. 65), 0.6 length of parameres and dorsal strut narrowly triangular, somewhat over 0.75 length of parameres; tips of parameres very slender and weakly divergent.

**DISCUSSION:** This member of the *E. pygmaeus* complex has been at various times treated as a subspecies, a synonym, and a good species. Leech (1948) as well as Horn, Winters, and others felt it was a subspecies of either *E. nebulosus* or *E. pygmaeus*. In the United States, it seems to be quite distinct. The lack of apparent elytral punctation, smaller size, very high prosternal crest, acute mesosternal crest, and overall pale color separate it from all other members of the *pygmaeus* complex. In Mexico and southern Texas, however, *E. p. pectoralis* intergrades with the typical *E. p. pygmaeus* and what has until recently been called *E. nebulosus*. This would indicate that it is not a separate species, but a member of a complex of subspecies.

LeConte's series of *P. pectoralis* contains 4 more specimens which do not appear to qualify as paralectotypes. One bears only the label "*maculifrons*" but according to M. Thayer (MCZ) it is not in LeConte's handwriting. The other 3 specimens from Santa Ana River, S. California bear the date IV-23-79. Since it seems impossible that these could have been collected in 1779 but must be from 1879 they postdate the description.

**DISTRIBUTION:** California, Nevada, Arizona, New Mexico, and southwestern Texas, then down through central Mexico and Lower California (fig. 82).

**SPECIMENS EXAMINED:** 1,680.

### *Enochrus (Methydrus) aridus* Gundersen, **new species**

Figs. 19-23, 68, 85

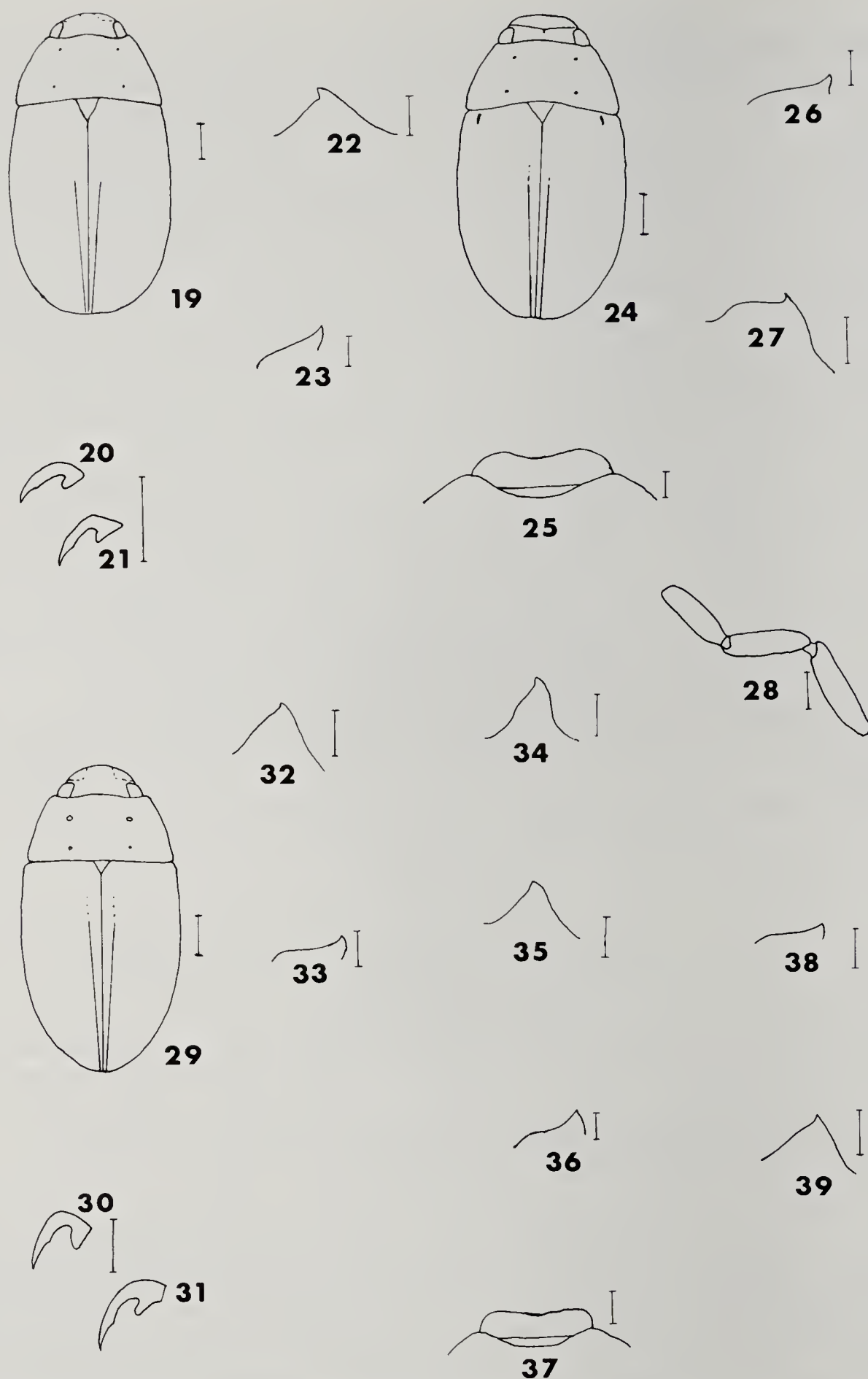
**HOLOTYPE:** male; Bear Canyon, Huachuca Mts., Arizona, V-8-1953, A. & H. Dietrich; Type No. 4424; Cornell. **ALLOTYPE:** female; Baboquivari Canyon, West side of Baboquivari Mts., Pima Co., Arizona VII-25-27-1952; Cornell. **PARATYPES:** 8, same data as holotype (1 author's collection); 5, same data as allotype (1 author's collection); 1, Baboquivari Mts., Arizona, XI-1-1934, Bryant Lot 104; Cornell.

**LENGTH:** 3.4-4.3 mm. **WIDTH:** 1.9-2.1 mm. **COLOR:** Dorsally yellow to brown, center of thorax somewhat, to much darker than wide anterior and lateral edges, center 1/2 to 1/3 of clypeus dark (Fig. 19), mesosternal crest and prosternum distinctly pale, epipleura same color to slightly darker than elytra, never dark brown. **ANATOMY:** Prosternal crest medium height (fig. 23); mesosternal crest a thin medium to large triangle (fig. 22), a distinct tooth at the tip, posterior edge nearly horizontal; clypeal emargination deep, smoothly rounded; abdominal notch small (fig. 68),  $W/D=2.0$ ; male protarsal claws untoothed (figs. 20, 21); male genitalia slightly stouter than those of closely related species (fig. 68); median lobe wide, parallel-sided, 0.65, dorsal strut 0.75 length of paramere.

**DISCUSSION:** Most similar in size, color, and structure to *E. sayi* and *E. cristatus*. It has the prosternal and mesosternal crest similar to that of *E. sayi* but the dark pronotal center of *E. cristatus*. This combination of characteristics, along with a smaller abdominal notch, and stouter genitalia, mark this as a distinct species with a limited distribution.

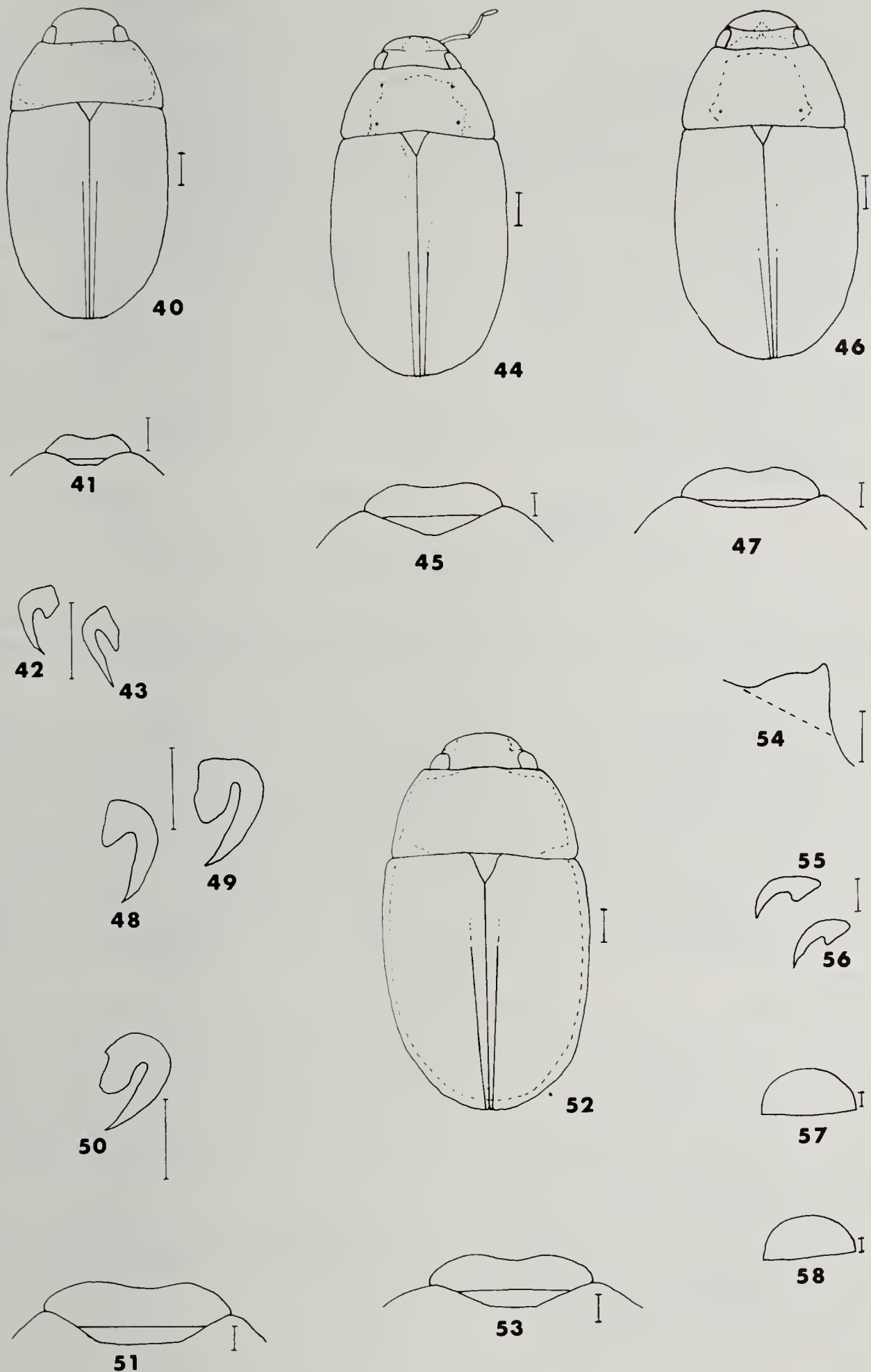
**DISTRIBUTION:** Extreme southern portions of California and Arizona (fig. 85).

**SPECIMENS EXAMINED:** 57.



Figs. 19-39: 19-23, *Enochrus aridus* (19, habitus; 20, outer male protarsal claw; 21, inner male protarsal claw; 22, mesosternal crest; 23, prosternal crest); 24-28, *E. sayi* (24, habitus; 25, clypeal emargination; 26, prosternal crest; 27, mesosternal crest; 28, maxillary palpus); 29-33, *E. pygmaeus pygmaeus* (29, habitus; 30, outer male protarsal claw; 31, inner male protarsal claw; 32, mesosternal crest; 33, prosternal crest); 34-37, *E. p. pectoralis* (34, 35, mesosternal crest; 36, prosternal crest; 37, clypeal emargination); 38, 39, *E. p. nebulosus* (38, prosternal crest; 39, mesosternal crest); (scale line represents 0.5 mm, figs. 19, 24, 29; 0.2 mm, figs. 22, 23, 26, 27, 32-36, 38, 39; 0.1 mm, figs. 20, 21, 25, 28, 30, 31, 37).





Figs. 40-58: 40-43, *Enochrus hamiltoni* dark form (40, habitus; 41, clypeal emargination; 42, outer male protarsal claw; 43, inner male protarsal claw); 44-45, *E. hamiltoni* typical form (44, habitus; 45, clypeal emargination); 46-49, *E. hamiltoni* light form (46, habitus; 47, clypeal emargination; 48, outer male protarsal claw; 49, inner male protarsal claw); 50-51, *E. diffusus* (50, inner male protarsal claw; 51, clypeal emargination); 52-57, *E. interruptus* (52, habitus; 53, clypeal emargination; 54, mesosternal crest; 55, outer male protarsal claw; 56, inner male protarsal claw; 57, section across abdomen); 58, *E. perplexus*, section across abdomen; (scale line represents 0.5 mm, figs. 40, 44, 46, 52, 57, 58; 0.2 mm, figs. 41, 54; 0.1 mm, figs. 42, 43, 45, 47-51, 53, 55, 56).

*Enochrus (Methydrus) negrus* Gundersen, **new species**

HOLOTYPE: male; Glen Ranch, Brewster Co., Alpine, Texas, 1926, O. C. Poling Collector; Type No. 9375, CAS.

LENGTH: 3.4 mm. WIDTH: 1.8 mm. COLOR: Totally black, punctuation indistinct. ANATOMY: Prosternal crest high and sharp, distinctly raised anteriorly; mesosternal crest large, sharp, anterior edge slightly concave; last two segments of maxillary palpi almost equal; clypeal emargination medium depth, flattened centrally; abdominal notch medium depth,  $W/D=1.2$ ; male protarsal claws with a distinct basal enlargement, forming a sharp angle with the rest of the claw; male genitalia essentially identical to those of *E. pygmaeus pectoralis*; median lobe broad, widened toward base, 0.63, dorsal strut narrowly triangular, 0.8 length of parameres.

DISCUSSION: The combination of anatomy plus the solid black color separate this from all other species. It is, however, very very close to *E. pygmaeus pectoralis* of which it may be a melanistic specimen. The type is in poor condition. Therefore, pending more collecting in southwestern Texas and Chihuahua and Coahuila, Mexico, I am placing it as the sole specimen of a new species.

*Enochrus (Methydrus) sayi* Gundersen, **new species**

Figs. 24-28, 67, 83

HOLOTYPE: male; Okeechobee, Florida, III-12-1943, Wm. Procter, Chamberlain Collection (Bears label *E. nebulosus*); Type No. 4425, Cornell. ALLOTYPE: female, same data as holotype, Cornell. PARATYPES: 39; same data as holotype, Cornell (4 author's collection).

LENGTH: 3.5-4.1 mm. WIDTH: 2.0-2.3 mm. COLOR: Dorsally yellow to pale brown except for vertex and central portion of clypeus (fig. 24), prosternum and mesosternal crest yellow to yellowish-brown, epipleura same color as elytra. ANATOMY: Prosternal crest very low, sharp, raised only at anterior end (Fig. 26); mesosternal crest large, posterior edge smoothly rounded almost horizontal toward front, a blunt anterior tooth (fig. 27); clypeal emargination smoothly rounded (fig. 25); abdominal notch medium width, shallow,  $W/D=2.0$  (fig. 67); maxillary palpi shorter and stouter than normal for group (fig. 28); male protarsal claws slightly enlarged basally; male genitalia (fig. 67) with median lobe wide, parallel-sided, 0.7, dorsal strut 0.75 length of parameres, ventrally visible portion of dorsal strut narrowly triangular.

DISCUSSION: *E. sayi* is distinguished from other United States members of this genus by the large posteriorly rounded mesosternal crest and very low prosternal crest (figs. 26, 27). The solid yellow dorsal color, and the pale epipleura, prosternum, and mesosternal crest separate it from the closest species, *E. pygmaeus pygmaeus*, and *E. p. nebulosus*. This widespread, abundant species probably will be found in many collections under *E. nebulosus* or *E. pygmaeus*.

DISTRIBUTION: Florida, central states which are drained by the Mississippi, Missouri, and Ohio Rivers, and the Great Lakes region to New England, not Minnesota or Manitoba (fig. 83).

SPECIMENS EXAMINED: 241.

*Enochrus (Methydrus) sharpi* Gundersen, **new species**

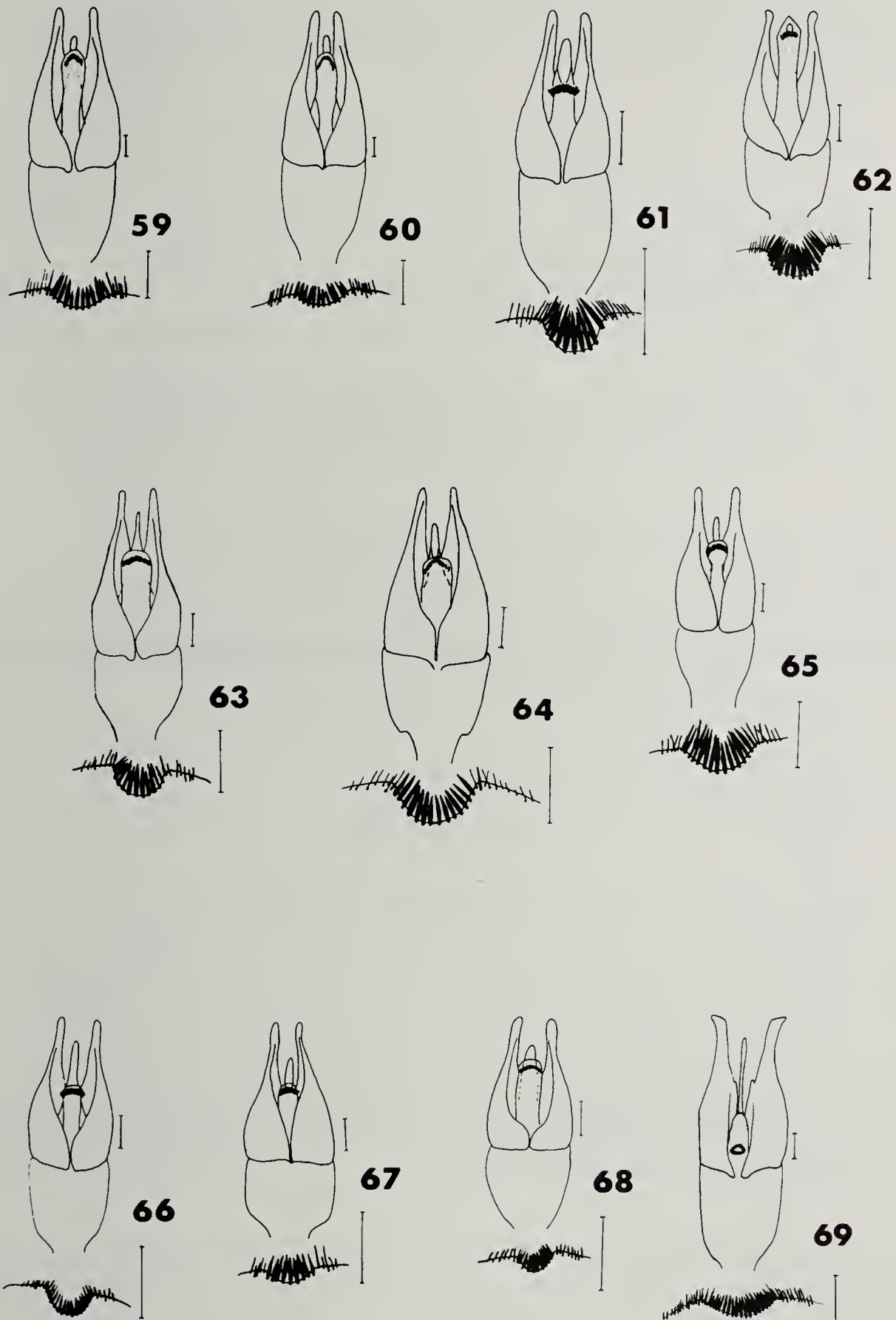
Figs. 14-18, 66, 78

HOLOTYPE: male; Culiacan, Sinaloa, Mexico, VII-16-1963, P. J. Spangler collector; Type No. 69622, USNM. ALLOTYPE: female, same data as holotype, USNM. PARATYPES: 20 male; 12 female; same data as holotype, USNM and author's collection (3 males, 2 females).

LENGTH: 3.0-4.2 mm. WIDTH: 1.9-2.3 mm. COLOR: Dorsally yellowish-brown to brown, center of pronotum normally light but occasionally distinctly darkened,



clypeus broadly black (fig. 14), prosternum and mesosternal crest paler to yellowish-brown, epipleura distinctly darker than elytra. ANATOMY: Punctation fine over whole dorsal surface; prosternal crest very low, sharp, raised slightly anteriorly (fig. 16); mesosternal crest extremely large, rectangular, thin, extending forward to between front coxae, posterior edge horizontal and straight (fig. 15); clypeal emargination fairly deep, smoothly rounded (fig. 18); abdominal notch narrow but deep (fig. 66),  $W/D=1.7$ ; male protarsal claws untoothed (fig. 17); male genitalia with median lobe short, narrow, parallel-sided, 0.5, dorsal strut narrowly triangular, 0.8 length of parameres (fig. 66).



Figs. 59-69, *Enochrus* male genitalia and emargination in last abdominal sternite (abdominal notch): 59, *E. piceus piceus*; 60, *E. carinatus carinatus*; 61, *E. ochraceus*; 62, *E. pseudochraceus*; 63, *E. pygmaeus pygmaeus*; 64, *E. pygmaeus nebulosus*; 65, *E. pygmaeus pectoralis*; 66, *E. sharpi*; 67, *E. sayi*; 68, *E. aridus*; 69, *E. interruptus*; (scale line represents 0.2 mm).

DISCUSSION: Very close to *E. aequalis* (Sharp); the mesosternal crest is long and the center of clypeus darkened like *E. aequalis* but punctation is a bit heavier, color slightly darker, and sutural stria not as distinct as described by Sharp (1882). Comparison of specimens of *E. sharpi* with the type of *E. aequalis* by P. J. Spangler and personal comparison with a homotype from the type series indicates that this is not *E. aequalis*. The very large rectangular mesosternal crest separates this from all other *Enochrus* from North and Central America.

DISTRIBUTION: Central and southern Mexico and Puerto Rico (fig. 78).

SPECIMENS EXAMINED: 170.

*Enochrus (Lumetus) hamiltoni* (Horn)

Figs. 40-49, 70, 71, 73-75

*Philydrus (Philydrus) hamiltoni* Horn 1890:249, Pl. III, Fig. 9.

*Philhydrus hamiltoni* Horn; Fall 1901:57.

*Enochrus (Lumetus) hamiltoni* (Horn); Zaitzev 1908:387.

*Philhydrus conjunctus* Fall 1901:217-218 (see type designation under *conjunctus*)

*E. collinus* Brown 1931:118 (Types in CNC, paratype examined).

*E. horni* Leech 1949:250-252 (Types at CAS, paratype examined).

*E. hamiltoni pacificus* Leech 1949:253-255 (Types at CAS, paratype examined).

*E. h. pyretus* Leech 1949:255 (Types at CAS, paratype examined).

*E. diffusus* Winters 1927:23 (*partim*) *fide* Leech 1949:253.

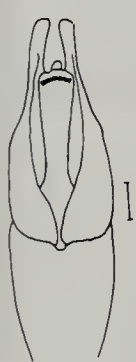
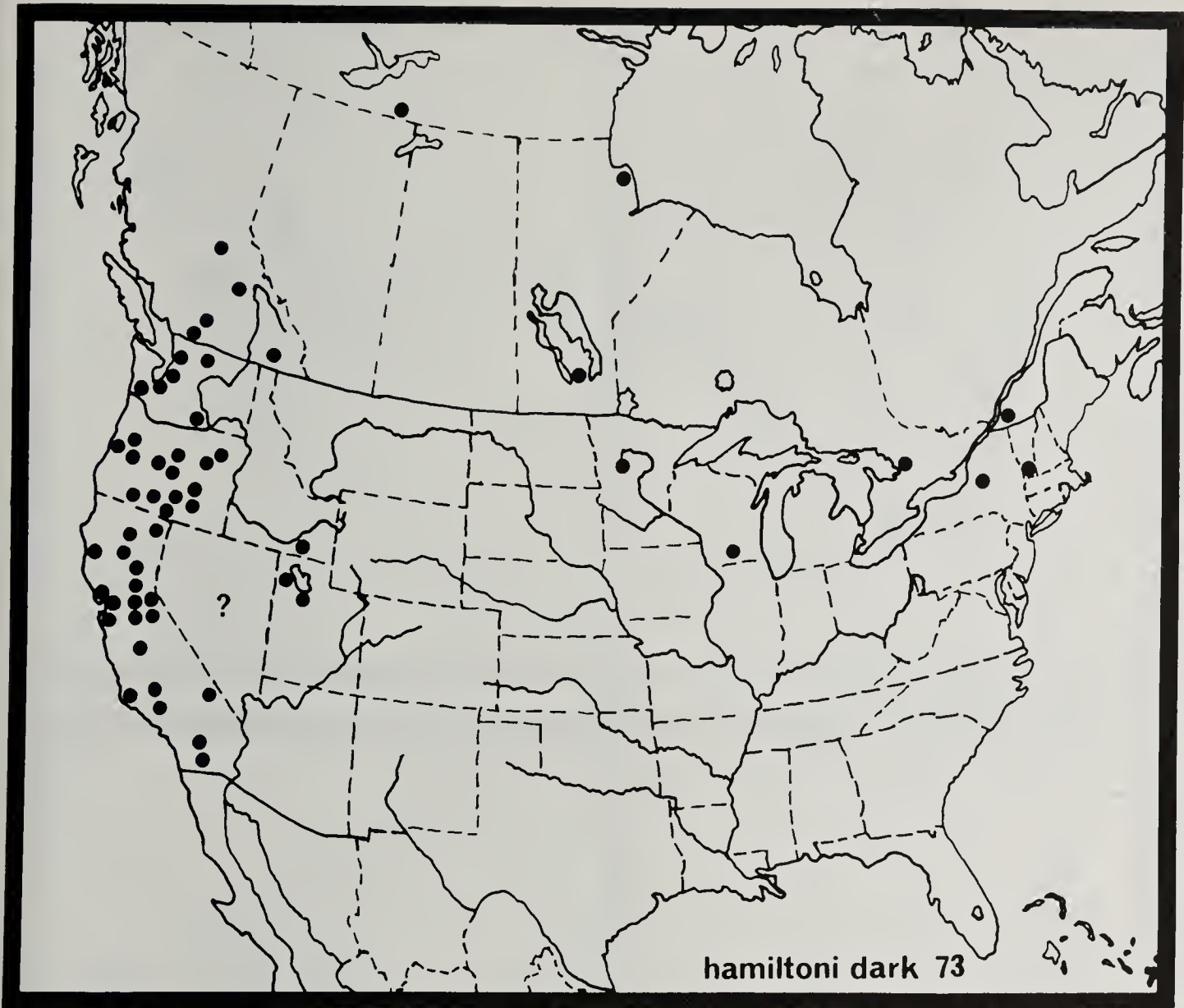
*Philhydrus lividus* Walker 1866:310-319 (*nec.* Forster) *fide* Miller 1964:71.

LECTOTYPE: male; New Jersey ("coast", description), Horn Collection, H-9215; Type No. 2976-1, MCZ (formerly ANS Phila.). PARALECTOTYPES: 3, Canada, 2976-4, 8, 10; 1, California (northern, description), 2976-5; 1, Oregon, 2976-7, 2, no data; and 2, Canada, these are probably 2976-2, 3, 9; 1 Massachusetts, listed in description. E. T. Cresson, Jr. quoted in Leech (1949) says, "Of the typical series besides the type, we have: two N.J., 2 Can., one Tyngs 5/8-72 of which one N.J. the two Can. and the Tyngs, are labeled paratypes." I cannot explain this discrepancy. Margaret Thayer of MCZ verified and provided an interpretation of the present state of the type series.

LENGTH: 4.3-6.1 mm. WIDTH: 2.3-3.1 mm. COLOR: Dorsal color highly variable; elytra yellow to black; pronotum totally light, centrally dark, or almost totally black (figs. 40, 44, 46). ANATOMY: Prosternum not carinate; mesosternal crest a broad triangle, either smoothly pointed or a blunt tooth at tip; clypeal emargination medium depth to deep, smoothly rounded (when deep, very center may be straight) (figs. 41, 45, 47); last abdominal segment not emarginate; male protarsal claws heavily and unequally lobed, the inner claw (figs. 43, 49) with lobe pointed to rounded and set at a slight to sharp angle with the free portion of claw, the larger the lobe the sharper the angle and narrower the slot between claw and lobe, lobe of the outer claw distinctly smaller (figs. 42, 48); mesotarsal claws equally lobed, lobe slightly smaller than that of the outer protarsal; metatarsal claws unlobed; male genitalia typical (figs. 70-71), median lobe 0.70-0.74 and dorsal strut 0.80-0.82 length of slender-tipped parameres, dorsal strut slightly to greatly exceeding median lobe.

DISCUSSION: After studying material from the total range of this species, I am recognizing 3 color forms: dark (*conjunctus*-form, almost totally black), light (*horni*-form, totally light), and typical (*hamiltoni*-form, only pronotal center dark). The dark form is limited to the West Coast with isolated populations along the Canadian-United States border. The other 2 forms are common over most of the United States and southern Canada.





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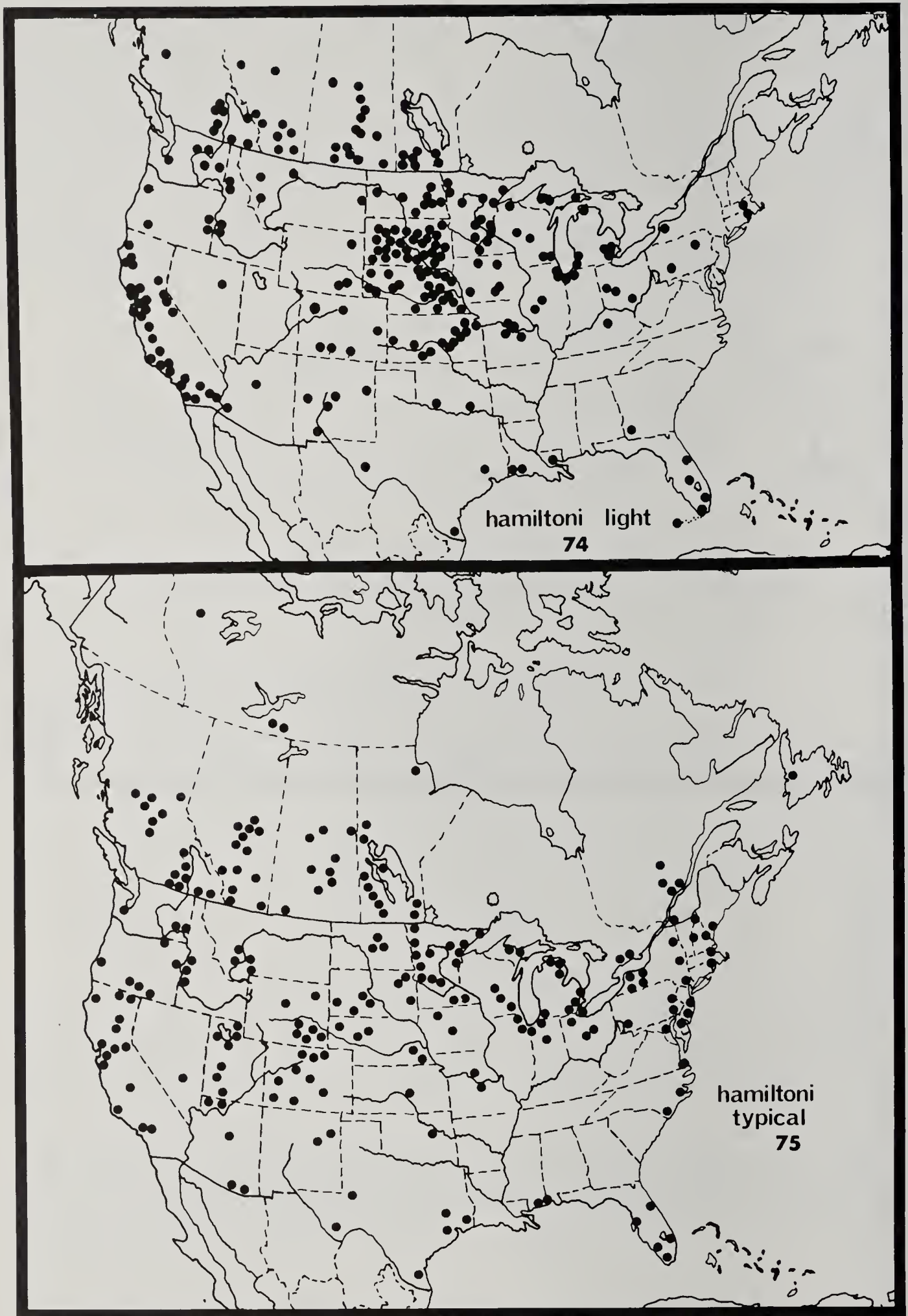


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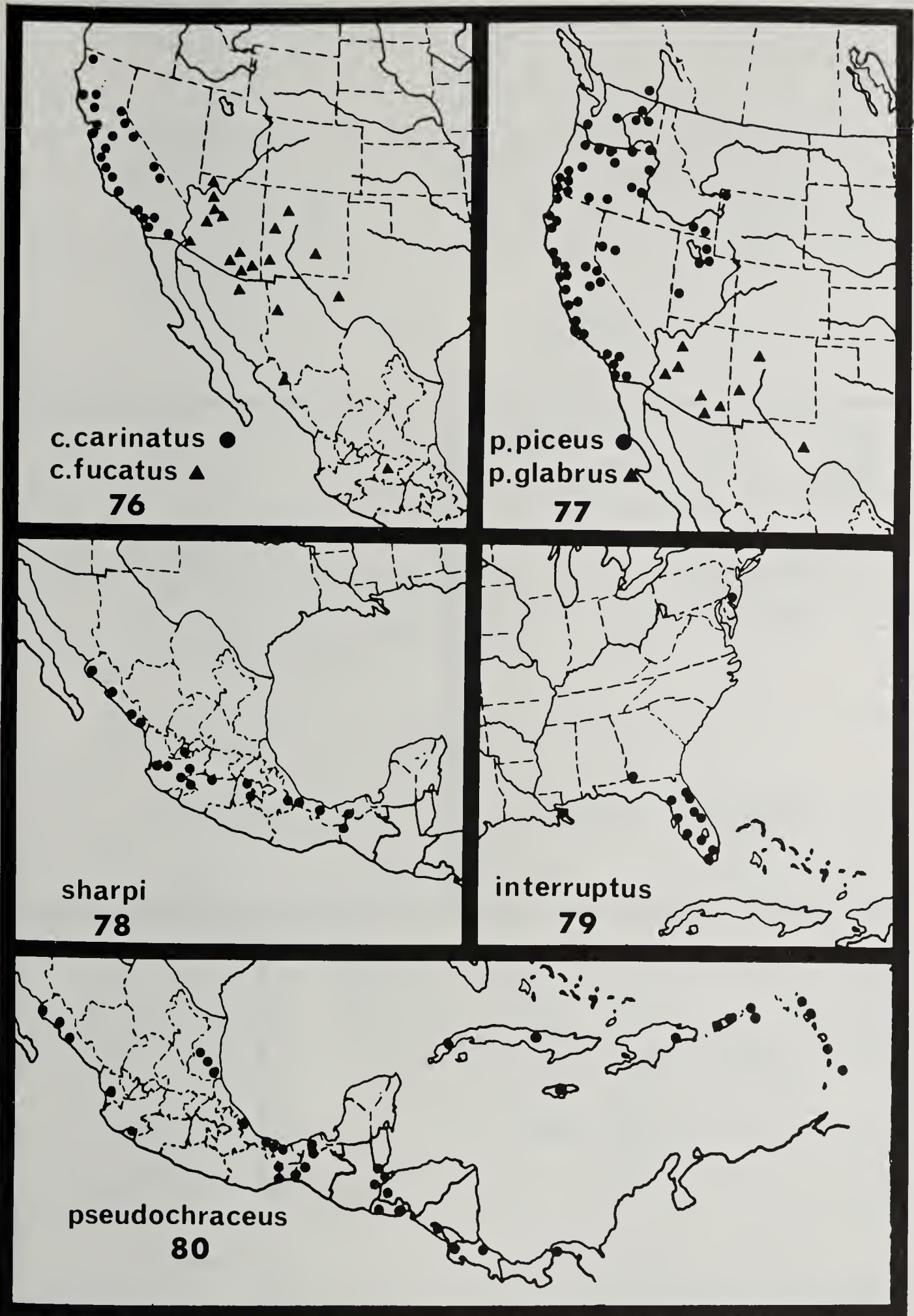
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Figs. 70-73, *Enochrus* male genitalia and distribution map: 70, 71, *E. hamiltoni*, 72, *E. diffusus*; 73, *E. hamiltoni* dark form; (scale line represents 0.2 mm).

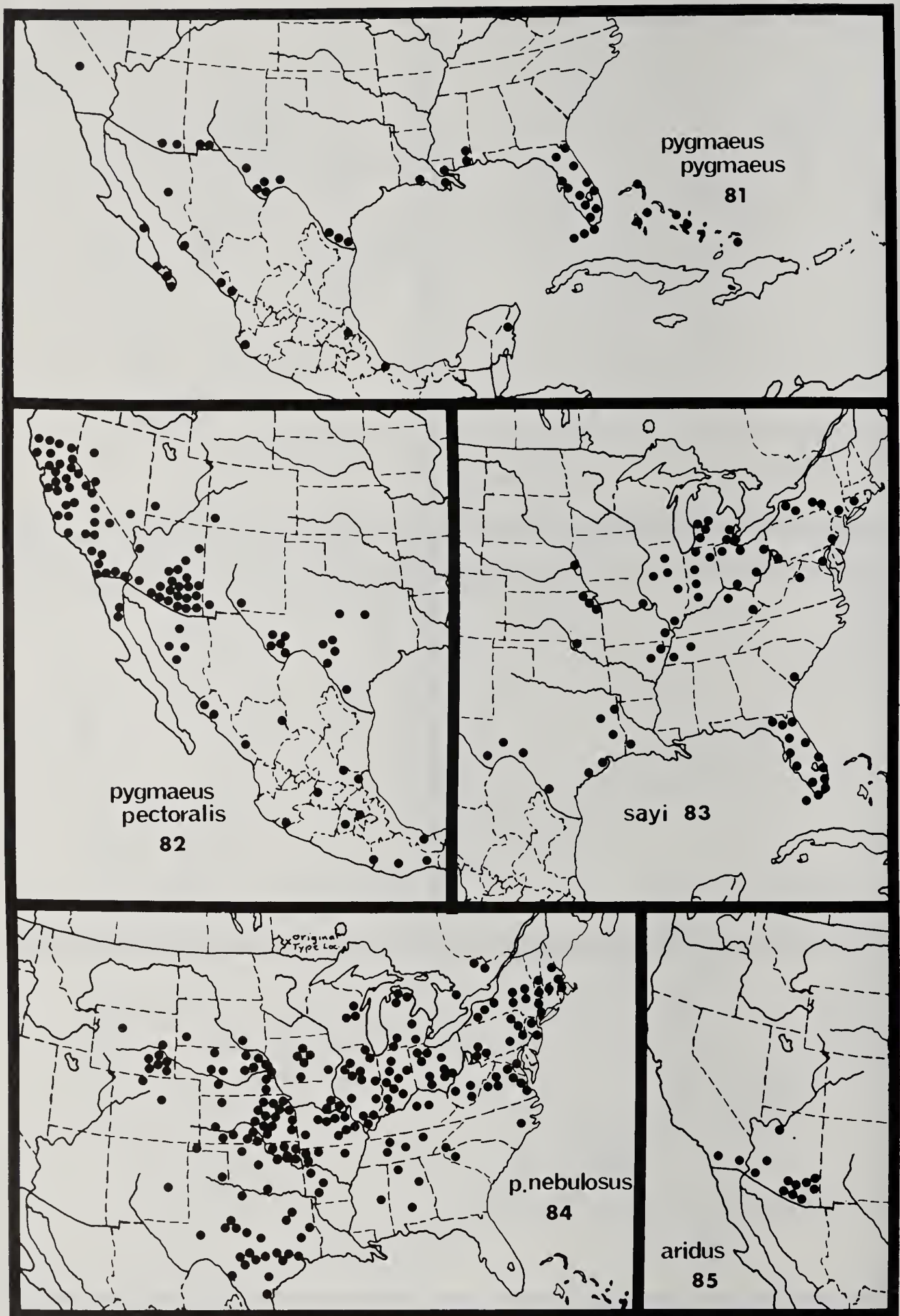


Figs. 74-75, *Enochrus hamiltoni* distribution maps: 74, light form; 75, typical form.





Figs. 76-80, *Enochrus* distribution maps: 76, *E. carinatus carinatus* and *E. c. fucatus*; 77, *E. piceus piceus* and *E. p. glabrus*; 78, *E. sharpi*; 79, *E. interruptus*; 80, *E. pseudochraceus*.



Figs. 81-85, *Enochrus* distribution maps: 81, *E. pygmaeus pygmaeus*; 82, *E. p. pectoralis*; 83, *E. sayi*; 84, *E. pygmaeus nebulosus*; 85, *E. aridus*.



I feel *E. hamiltoni* is a polymorphic species which at this time cannot be split into subspecies. Local populations of this species are often distinct in proportions of the claws, relative lengths of dorsal strut and median lobe of the male genitalia, and color pattern; but these differences vary independently, making subspecies separation impossible. The 3 forms are most distinct in the northeastern states, from Minnesota east, and eastern Canada. Possibly glaciation in this area or some other phenomenon separated populations long enough for some genetic isolation. I recommend distinguishing the forms when possible. Further study may discover characters, at least in the east, allowing subspecific separation.

The typical form is not likely to be confused with any other Nearctic species. The light form can be confused with *E. diffusus*, which has the central portion of the clypeal emargination broadly flattened (fig. 51), a significantly longer dorsal strut (fig. 72), and larger lobes on the male pro-tarsal claws (fig. 50). The dark form is superficially similar to other nearly to totally black species. *E. piceus* and the *E. cinctus* group are all much more highly convex. *E. perplexus* and *E. interruptus* differ in having at least a fringe of golden bristles at the center of the last abdominal sternite, which is lacking in all *Lumetus*.

**DISTRIBUTION:** Throughout the United States and Canada. The dark form is limited to the western states with scattered populations across Canada and from Minnesota to Vermont (figs. 73-75).

**SPECIMENS EXAMINED:** 7,000.

#### TYPE SPECIMEN DESIGNATIONS

Many of the species in this genus were described by Horn, LeConte, Melsheimer, and Zimmermann. Series of cotypes are in their collections and in most cases lectotypes have not been designated. I have designated lectotypes and paralectotypes from their series for the following species, as well as for several already discussed in this article.

*Philhydrus blatchleyi* Fall 1924:85-86 (= *Enochrus (Methydrus) blatchleyi* (Fall)).

**HOLOTYPE:** male; Dunedin, Florida, IV-3-1923, Fall collector; Type No. 24005, Fall Collection, MCZ. **PARATYPES:** 1 female; Dunedin, Florida, IV-6-1922; 2 same, IV-2-1923; 1 Tarpon Springs, Florida, III-31-1922; 5 (2 male, 2 female) St. Petersburg, Florida, IV-6-1923; 1 same, IV-4-1922; 1 same, III-26-1923: Fall Collection, MCZ. Last specimen in series from St. Petersburg bears the date III-28-1925 so cannot be a paratype.

*Philydrus (Philydrus) californicus* Horn 1890:248 (= *Enochrus (Methydrus) californicus* (Horn)).

**LECTOTYPE:** male; California (probably northern, description), Horn Collection, H 9314; Type No. 2974, MCZ (formerly ANS Phila). **PARALECTOTYPE:** sex unknown; same data; Horn Collection, MCZ.

*Philhydrus conjunctus* Fall 1901:217 (= *Enochrus (Lumetus) hamiltoni* (Horn)).

**LECTOTYPE:** male; Lake Tahoe, California, '98; Type No. 24006, Fall Collection, MCZ. **PARALECTOTYPES:** 1 male, 1 female, same data; Fall Collection, MCZ.

*Philydrus consors* LeConte 1863a:24 (= *Enochrus (Methydrus) consors* (LeConte)).

**LECTOTYPE:** female; Louisiana; Type No. 3103 *P. consors* LeC., LeConte Collection, MCZ. The other 5 specimens in the series are from Florida and New Hampshire so cannot be part of the type series.

*Philhydrus (Philhydrus) cristatus* LeConte 1855:370 (= *Enochrus (Methydrus) cristatus* (LeConte)).

HOLOTYPE: female; gold dot, California (San Diego, description); Type No. 3086, LeConte Collection, MCZ. This is the only specimen listed in the description so it is the holotype. The 3 marked "Cal." in LeConte's Collection, therefore, are neither paratypes nor paralectotypes.

*Hydrobius cuspidatus* LeConte 1878:597-598 (= *Enochrus (Enochrus) cuspidatus* (LeConte)).

LECTOTYPE: male; Lake Tahoe, California, Crotch collector; Type No. 3112, LeConte Collection, MCZ. This is the only specimen matching the locality and collector listed in the description. The specimens labeled "Cal." (1) and gold dot (California) (1) in LeConte's Collection therefore are neither paratypes nor paralectotypes.

*Philhydrus (Philhydrus) diffusus* LeConte 1855:371 (= *Enochrus (Lumetus) diffusus* (LeConte)).

LECTOTYPE: sex unknown; green dot (California and Nebraska, description); Type No. 3087<sup>4</sup>, LeConte Collection, MCZ. PARALECTOTYPES: 3 green dot; LeConte Collection, MCZ. All other specimens in LeConte's Collection were collected at localities not listed by LeConte.

*Philhydrus elongatulus* Fall 1924:85 (= *Enochrus (Methydrus) sublongus* (Fall)).

HOLOTYPE: female; Dunedin Florida, IV-6-1922, Fall collector; Type No. 24007, Fall Collection, MCZ. PARATYPES: 1 Dunedin, Florida, IV-2-1923; 1 Tarpon Springs, Florida, III-31-1921; 1 St. Petersburg, Florida, IV-4-1922, MCZ. All others in the series were collected in 1925 or localities not listed by Fall.

*Philhydrus (Helochares) fimbriatus* Melsheimer 1844:101 (= *Enochrus (Methydrus) perplexus* (LeConte)).

LECTOTYPE: male; pink dot, Middle States (Pennsylvania, description); Type No. 32358, 2nd specimen in series in LeConte's Collection, MCZ. PARALECTOTYPES: female; same data, 1st specimen in series; LeConte Collection, MCZ. All other specimens in series are from areas other than Pennsylvania (4th is *Cymbiodyta semistriatus*).

*Philhydrus (Philhydrus) lacustris* LeConte 1855:369-370 (= *Enochrus (Methydrus) ochraceus* (Melsheimer)).

HOLOTYPE: female; faded blue dot (Lake Superior), (Eagle Harbor, Lake Superior, Michigan, description); Type No. 3088, LeConte Collection, MCZ. This is the only specimen and bears the label "*Philhydrus lacustris* Lec. = *Enochrus ochraceus* Melsh/see Fall 1924:89." This should read :87.

*Philhydrus limbalis* Melsheimer 1844:101 (= *Enochrus (Methydrus) cinctus* (Say)).

LECTOTYPE: sex unknown; no data, (Pennsylvania, description), does bear a Ziegler label; Type No. 32359, Melsheimer-Ziegler Collection, MCZ. PARALECTOTYPE; bears same data as lectotype, MCZ.

*Philhydrus ochraceus* Melsheimer 1844:101 (= *Enochrus (Methydrus) ochraceus* (Melsheimer)).

LECTOTYPE: sex unknown; orange (brick red) dot, Southern States: (Pennsylvania, description); Type No. 32360, MCZ. There is no specimen of *E. ochraceus* in Melsheimer's Collection. However, in a letter from John L. LeConte to Alexander Agassiz (Darlington 1961) LeConte says he has in his collection "all unique types" of Melsheimer's species. LeConte (1855:371) also states the type is very immature (teneral). The first specimen in LeConte's series of *E. ochraceus* is teneral but is labeled with an orange (brick red) dot (see above). This refers to a more southern area than listed by Melsheimer (Pennsylvania), but the only other teneral specimen in his series is from Florida (series examined by Margaret Thayer, MCZ, April, 1977). I feel this must be Melsheimer's original type specimen with a wrong locality tag on it. It should have been a pink dot for the Middle States. Therefore, I am designating it as the lectotype of *E. ochraceus*.

*Philhydrus (Philhydrus) perplexus* LeConte 1855:371 (= *Enochrus (Lumetus) perplexus* (LeConte)).

LECTOTYPE: male; yellow dot, Central Valley or Western States (New York,



Illinois, Lake Superior, Nebraska, description); Type No. 3090<sup>3</sup>, LeConte Collection, MCZ. PARALECTOTYPES: 1 green dot (Neb., Kans., N.Dak., S.Dak., Okla., Colo., Wyo., Mont.); 2 pink dot (Middle States; Md., Del., N.Y., N.J., Pa., Conn.?, R.I.); LeConte Collection, specimens 4, 1, and 2 respectively, MCZ. All other specimens in the series are either from other localities or are not *E. perplexus*.

*Philhydrus reflexipennis* Zimmermann 1869:250 (= *Enochrus (Lumetus) reflexipennis* (Zimmermann)).

LECTOTYPE: male; New Jersey (7422.2); Type No. 3140, LeConte Collection, MCZ. PARALECTOTYPES: 1 New Jersey; 1 Delaware; 2 pink circle (Middle States, see *E. ochraceus* for list); 1 New York; LeConte Collection, MCZ.

*Philydrus simplex* LeConte 1863a:24 (= *Enochrus (Methydrus) ochraceus* (Melsheimer)).

LECTOTYPE: sex unknown; Louisiana, Mr. Ulke; Type No. 3104, *P. simplex* LeC., LeConte Collection, MCZ. PARALECTOTYPE: Louisiana; Type No. 3104 *simplex* 2, LeConte Collection, MCZ.

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